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IS 7738 (1975): Safety fuse for commercial use [CHD 26:
Explosives and Pyrotechnics]

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SPECIFICATION FOR SAFETY FUSE FOR COMMERCIAL USE

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(Continued from page 1)

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Indian Standard

SPECIFICATION FOR SAFETY FUSE FOR COMMERCIAL USE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 5 August 1975, after the draft finalized by the Explosives and Pyrotechnics Sectional Committee had been approved by the Chemical Division Council.

0.2 Safety fuse is an explosive accessory used for blasting. It burns at a specified rate and does not explode. Large quantities of safety fuse are now being produced by a number of manufacturers in the country. The users of safety fuse have been experiencing difficulty in procuring the material of uniform grade and quality. This standard has been formulated with a view to facilitating manufacture and procurement of the material which would be safe during transport, handling and storage, and which would have adequate life and satisfactory performance under specified conditions of use (see 2.1).

0.3 This standard requires reference to IS : 6609 (Part V)-1972* which is a necessary adjunct to it.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for safety fuse for commercial purposes.

2. TYPES

2.1 The material shall be of the following three types:

- Type A* for use in all conditions, namely, dry, damp and wet;
- Type B* for use in damp and dry conditions; and
- Type C* for use only in dry conditions.

*Methods of test for commercial blasting explosives and accessories : Part V Safety fuses.

†Rules for rounding off numerical values (revised).

3. REQUIREMENTS

3.1 Description — The safety fuse shall consist of a train of black powder enclosed in a paper tape or several strands of wound jute or cotton yarn, then covered with one or more layers of jute or cotton yarn, bitumen and colouring composition. It may also be covered with other suitable waterproofing medium, such as PVC, polyethylene and gutta-percha to produce a fuse which shall stand the specified conditions of use. The fuse shall be capable of burning continuously at a uniform rate along its entire length.

3.1.1 The black powder used for making the safety fuse shall be essentially a mixture of potassium nitrate, sulphur and charcoal (*see IS : 7124-1973**).

3.2 The fuse shall also comply with the requirements prescribed in Table I, when tested according to the methods prescribed in IS : 6609 (Part V)-1972†. Reference to the relevant clauses of IS : 6609 (Part V)-1972† is given in col 6 of the table.

3.3 Dampproofness — Type B of the material shall also pass the test for dampproofness as prescribed in Appendix A.

4. PACKING AND MARKING

4.1 Packing — The safety fuse shall be packed in the form of bundles, spirals or spools in fibreboard or wooden cases approved by the Chief Controller of Explosives, India. The mode of packing bundles, spirals and spools shall be as agreed to between the purchaser and the supplier. Each case shall be provided with a suitable waterproofing liner to prevent ingress of moisture into the fuse. Each case shall contain 1500 metres of fuse or any other quantity as agreed to between the purchaser and the supplier.

4.1.1 Where the material is required to be transported by rail, the packing shall conform to the provisions of Indian Railways Conference Association Red Tariff No. 18.

4.2 Marking — The cases shall be legibly and indelibly marked with the following information:

- a) Name and type of the material;
- b) Total length of fuse, number of coils and form of packing;
- c) Manufacturer's name and/or recognized trade-mark, if any;
- d) Date of manufacture; and
- e) Lot number in code or otherwise to enable the batch of manufacturer to be traced from records.

*Specification for gun powder.

†Methods of test for commercial blasting explosives and accessories: Part V Safety fuses.

TABLE I REQUIREMENTS FOR SAFETY FUSE FOR COMMERCIAL USE

(Clause 3.2)

SL No.	CHARACTERISTIC	REQUIREMENT			METHOD OF TEST [REF TO CL NO. IN IS : 6609 (PART V)-1972*]
		Type A	Type B	Type C	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Diameter, mm	5 ± 0.2	5 ± 0.2	4.3 to 5.2	3.1
ii)	Burning speed, s/m	†Nominal speed ± 10	†Nominal speed ± 10	†Nominal speed ± 10	3.2
iii)	Gap sensitivity	To pass the test	To pass the test	To pass the test	3.5
iv)	Lateral transmission	No lateral transmission; burning speed within limits given at Sl No. (ii)	Same as for Type A	Same as for Type A	3.6
v)	Behaviour under adverse conditions:				
a)	High temperature	Variation in burning speed not more than ± 10 percent of original average burning speed	Same as for Type A	Same as for Type A	3.4
b)	Low temperature	No surface cracks; variation in burning speed not more than ± 10 percent of original average burning speed	Same as for Type A	Same as for Type A	3.4
vi)	Water proofness	Shall burn through	—	—	3.3

*Methods of test for commercial blasting explosives and accessories: Part V Safety fuses.

†Nominal speed shall be declared by the manufacturer or shall be as agreed to between the purchaser and the supplier. However, it shall be not less than 80 s/m.

4.2.1 The cases may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING

5.1 The method of drawing representative samples of the material, number of tests to be performed and the criteria for conformity of the material to the requirements of this specification shall be as prescribed in Appendix B.

A P P E N D I X A

(Clause 3.3)

TEST FOR DAMPROOFNESS OF TYPE B MATERIAL

A-1. APPARATUS

A-1.1 A perforated mild steel tray 1.25 m in length, 0.45 m in breadth and 0.15 m in height, filled up to 0.13 m depth with sand of 850 micron (average size) fineness.

A-2. PROCEDURE

A-2.1 Spread the sand uniformly all over the tray. Fill the tray with water at ambient temperature and then allow the water to drain out for one hour.

A-2.2 Take 2 m length of the fuse from the sample to be tested discarding about 5 cm of the exposed ends of the sample. Place it longitudinally 5 cm below the wet sand, keeping 10 cm lengths from both ends well outside the sand. Cover well with wet sand. Remove the fuse after 2 hours, cut 1 m length from the middle and test for continuity of burning.

A-2.3 The material shall be considered to have passed the test if the entire length burns through.

APPENDIX B

(Clause 5.1)

SAMPLING OF SAFETY FUSE

B-1. GENERAL REQUIREMENTS OF SAMPLING

B-1.0 In drawing samples the following precautions shall be observed.

B-1.1 Samples shall not be taken in an exposed place.

B-1.2 Precautions shall be taken to protect the samples and the material being sampled from exposure to heat and moisture.

B-1.3 Samples shall be placed in clean and dry containers.

B-1.4 Each sample container shall be marked with full details of sampling and the date of sampling.

B-2. SCALE OF SAMPLING

B-2.1 Lot — In a single consignment of one type of fuse all cases manufactured in one day shall constitute a lot. If a consignment is declared or known to consist of different types or different days' production, the cases belonging to the same type and day's production shall be grouped together and each such group shall constitute a lot.

B-2.2 Samples shall be tested from each lot for ascertaining conformity of the material to the requirements of this specification.

B-2.3 The number of cases to be chosen from a lot (n) shall depend on the size of the lot (N) and shall be in accordance with Table 2.

TABLE 2 SCALE OF SAMPLING

LOT SIZE (N)	SAMPLE SIZE (n)
(1)	(2)
Up to 15	3
16 to 40	4
41 , , 65	5
66 , , 110	7
111 and above	10

B-2.4 The cases shall be chosen at random from the lot. In order to ensure randomness of selection, random sampling procedures given in IS : 4905-1968* may be followed.

B-3. PREPARATION OF TEST SAMPLES AND REFEREE SAMPLE

B-3.1 Collect at least 30 metres of fuse from each case selected as in **B-2.3** and **B-2.4**. The total length of the material drawn from each case shall be sufficient to conduct the tests for all the characteristics given in 3.2 and 3.3. These samples from different cases shall constitute individual samples.

B-3.2 Each individual sample shall be divided into three equal parts, one for the purchaser, the second for the supplier, and the third to be used for referee sample.

B-3.3 Referee Sample — A set of individual samples (*see B-3.2*) shall be marked for this purpose and shall bear the seals of purchaser and the supplier. It shall be kept at a place agreed to between the purchaser and the supplier and shall be used in case of dispute between the two.

B-4. NUMBER OF TESTS

B-4.1 Burning Speed — Two tests shall be performed on each individual sample.

B-4.2 Gap Sensitivity — One test shall be performed on each individual sample.

B-4.3 Behaviour Under Adverse Conditions — Two tests each for high temperature and low temperature shall be performed on each individual sample.

B-4.4 Lateral Transmission — One test shall be performed on each individual sample.

B-4.5 Waterproofness — Two tests shall be performed on each individual sample.

B-4.6 Dampproofness — Two tests shall be performed on each individual sample.

B-4.7 Diameter — Ten tests shall be performed on each individual sample.

B-5. CRITERIA FOR CONFORMITY

B-5.1 Burning Speed and Diameter — The average and range of test results for determinations on each individual sample shall be computed. If

*Methods for random sampling.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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